ESTABLISHMENT OF TRUCK INN & PUBLIC TRANSPORT FACILITIES IN THE LIMPOPO PROVINCE

PHASE 1

VOLUME 3

MUSINA TRAFFIC & LOAD CONTROL CENTRE

DEPARTMENT OF TRANSPORT

FINAL REPORT
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VOLUME 3:
ESTABLISHMENT OF TRUCK INN & PUBLIC TRANSPORT TRANSFER FACILITIES: MUSINA TRAFFIC & LOAD CONTROL CENTRE

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VOLUME 3: ESTABLISHMENT OF TRUCK INN & PUBLIC TRANSPORT TRANSFER FACILTIES: MUSINA TRAFFIC & LOAD CONTROL CENTRE

1. INTRODUCTION

1.1 PURPOSE OF REPORT

This document is an interim report dealing with a conceptional framework and business plan for the development of a Traffic Control Centre and other supporting facilities on the N1 at Musina.

The interim report contains proposals with supporting motivation and discussion on the necessity, implementation and financial implication of the development of a Traffic Control Centre to be situated directly north of Musina at the T-junction with the Pontdrift provincial road, which includes a Load Control Centre (LCC) and other Traffic Control and Ancillary facilities on the N1 in the Limpopo Province.

1.2 BACKGROUND AND MOTIVATION

1.2.1 Introduction

The N1 is a very prominent national road as it provides the main access route from the northern part of the country not only to the Limpopo region but also to the neighbouring African countries to the north of South Africa (see Locality Map on **Figure 1**).

The traffic population on the N1 in the Limpopo Province includes local inter–provincial, regional intra-provincial as well as a significant percentage of long distance haulier trucks, travelling beyond the borders of South Africa.

The proposed load and traffic control centre at Musina is part of a more comprehensive program to counter-act overloaded trucks that are common on South African roads. They cause extensive damage to road pavements, contribute to accidents and distort competition amongst hauliers.

The cost implication for expenditure on South African roads, which inevitably affects the whole economy, is very significant. The cost of damage to South Africa's roads was estimated at R750 million in 2001, and this figure is still growing.

The most significant concentrations of overloaded vehicles are inevitably encountered on the national routes between Gauteng and other strategic locations, and overloading control on these major national routes i.e. the N1, N3 and N4 is thus of major importance. The establishment of Load Control Centres (LCC) on these roads is this of vital importance to protect South Africa's road infrastructure.

1.2.2 Impact of Overloading

The motivation for the load and traffic control facilities at Musina is primarily linked to the impact of overloading on the roads. As such, it is very important to consider the relationship between loading and road damage in order to appreciate the value of overloading control.

The damage caused by an axle load is expressed in terms of E80's, which can be viewed as a unit of road damage caused by a standard axle load of 80kN (± 8.2 tons).

The relationship between axle load and road damage (E80) is not linear, and is approximated by an exponential function of the following general formula:

$$E80s = (A / 80\ kN)^b$$

Where A = axle load in kN
b = pavement damage coefficient

Research has shown that the damage coefficient is lower for “deep” pavement structures (as found on national roads in Britain and the USA) than for “shallow” pavements. South African pavements are relatively shallow compared to those found in developed countries, and a damage coefficient of 4.2 is for instance used to calculate road damage on the N1 Toll Road between Warmbaths and Pietersburg.

The significance of this exponential relationship between axle load and road damage, is that an axle that is overloaded by 10% causes 50% more damage than a legally loaded axle. The percentage of overloading at Kranskop (which not too far north of the Mantsole LCC) is currently in the order of 15-20%, regardless of the efforts to control overloading. The extent of overloading further north is uncertain, but it can be reasonably assumed that it may well be higher than at Kranskop.

Reliable and unbiased information on the extent and magnitude of truck overloading is scarce. The recent implementation of an overloading strategy on the N1 corridor between Warmbaths and Pietersburg, on the N3 corridor between Heidelberg and Pietermaritzburg and the current implementation of an overloading control strategy on the Maputo corridor has improved the situation significantly.

A holistic strategy to protect all South Africa’s major freight corridors is, however, needed to reduce the magnitude of overloading. Overloading control north of Polokwane is at present ad hoc and no permanent Load Control Centre exists at present.

1.2.3 Current Overloading Management on the N1

The Northern Toll Road Venture (NTRV) operates the N1 Toll Road between Warmbaths and Pietersburg. The monitoring and management of overloading form an integral part of the contract with SANRAL, and two permanent weigh-in-motion (WIM) stations are operated on a permanent basis at Kranskop and just south of Pietersburg on the N1.

Overloading is further controlled and offenders prosecuted at the Mantsole TCC, some 60km north of Pretoria. No overloading management procedures are however in place north of Pietersburg, and since many of the larger trucks on the N1 north of Pretoria make use of the total section to Beitbridge, overloading control further north is important.

1.2.4 Steps Towards Provision of Sustainable Road Infrastructure

Although the history of attempts to control truck overloading in this country is long, the undesirable situation still prevails. Due to budgetary and other restrictions, law enforcement is operating in a sporadic rather than systematic manner, and with insufficient power and success.

Even in the absence of extensive information it is evident that the balance between the interests of those that move goods on roads and those that provide the road infrastructure is distorted in favour of the former.

While overloaded vehicles are damaging roads, the annual road budget in real terms is diminishing, and the condition of roads is deteriorating. There appears to be no way to solve this problem without paying for it, in one form or another.

The main target areas for more productive investment are:

- More expensive and powerful law enforcement system
- Stronger roads and bridges

These expenditures have to be evaluated against other alternative costs that are uncured:

- Upkeep and repair of roads damaged by overloading, and
- Higher vehicle operating costs and bears the economic consequences of a gradually collapsing road infrastructure.

It is argued that the first option concerning law enforcement, albeit expensive, is feasible and still affordable, whereas maintaining the status quo and allowing the last option to evolve would have disastrous and indelible economic consequences for the future of this country.

A strategically located TCC north of Pietersburg, in conjunction with the Mantsole TCC towards the south, will thus be a valuable step towards the protection of the N1 corridor between Pretoria and Beitbridge against unnecessary additional damage caused by overloading.

1.2.5 Additional Integrated Facilities

The development of a Load Control Centre also provides the ideal opportunity to incorporate additional facilities for the road user as part of one integrated facility or as adjacent supporting facilities (see examples below).

Although it is proposed that the different facilities be developed in conjunction with each other, the actual layout should still differentiate distinctively between the load control component and the commercial or general road user component.

The following land uses with appropriate facilities and infrastructure may thus be considered as part of the total facility:

(i) Traffic Control Centre

- **Over-load control facilities**, including a weighbridge, weigh-in-motion equipment, reload staging area, adjacent office building etc.
- **Law Enforcement Facilities** with offices for law enforcement officers and also to accommodate other law enforcement agencies such as the Cross-border inspectors and other regulatory personnel dealing with operating licenses (taxis and buses).
- **Traffic Court.**
- **Traffic Support Services** with offices for license renewals, payment of fines, vehicle registration, etc.

(ii) Other Transport Related Facilities

- **Truck-inn facility** with a staging area for a limited number of vehicles, ablutions and other facilities, taking into account the facilities that are already available at Beit Bridge.
- **Public transport transfer facility** for long distance taxi and bus services to accommodate about 40 taxis and 10 buses.

(iii) Supporting Commercial Facilities

The potential for other commercial activities at this point is extensive. Yet a realistic view must be taken in terms of what the market can bear at this point.

It is perhaps not realistic to expect that all or some of these activities would be successful and as a result, the approach to be adopted is that private sector interest should govern the future further developments.

- **Fuel station** with supporting facilities normally associated with an Ultra City/Star Stop type of service station.
- **Accommodation** for tourists and/or the trucking community either as two separate facilities or as an integrated accommodation centre (hotel).
- **Customs services** with office accommodation for private sector agencies that can assist to speed up the entire customs process.
- **Recreational facilities** for truckers and passenger transport operators.
- **Health care centre** to provide for basic medical assistance and HIV support.
- **Fast food outlet and restaurant** for tourists and transport operating personnel.
- **Arts and craft stalls**.
- **Informal hawker stalls**.

2. LOCATION OF PROPOSED TRAFFIC CONTROL CENTRE

2.1 BACKGROUND

The original objective of this study was to investigate the need for truck-inn facilities along the main routes within Limpopo Province. Based on the results of the first phase report, Beit Bridge was identified as one of the priority areas where such facilities are needed.

However, at the point in time when the positions were identified, some private sector initiatives have already responded to natural market related factors and a truck inn facility is in the process of development at Beit Bridge, which defeats the object of pursuing the issue any further.

Nevertheless, a number of other transport-related activities that are linked to the Musina/Beit Bridge section of the N1 corridor have also been identified as important development prospects. One of these is a comprehensive Traffic Control Centre that could accommodate a range of law enforcement and general traffic control functions.

2.2 CONCEPTIONAL APPROACH

Based on the responses from the internal workshops, it was decided to pursue the possible development of such a traffic control centre at a position directly north of Musina. Refer to Figure 1 indicating a locality map.

The suggestion to locate the traffic control centre at Musina follows arguments that were raised at the internal workshops as follows:

- The available land to provide for a traffic control centre and other supporting services and facilities at Beit Bridge is limited

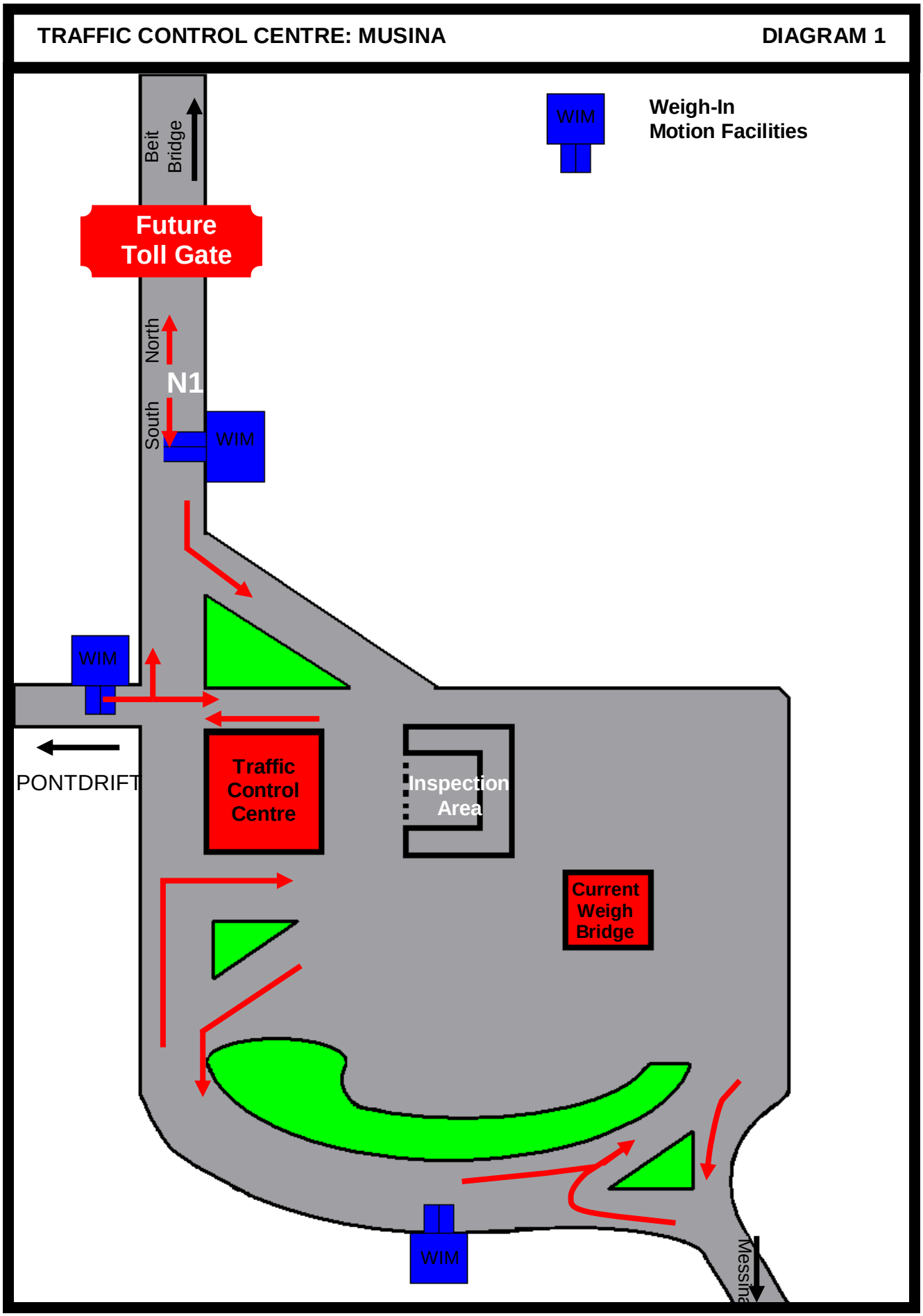
- Congestion is already prevailing at the border post and a structure plan for the entire border post is needed, which will take time to address.

- From a practical point of view, the traffic control centre can be positioned at any point between the border post and Musina as no other road leads out of - or into the N1 between these two points.

- To service the traffic control centre with human resources, bulk services and other support services, it would be preferable to locate the centre as close as possible to Musina. There is in fact no point in locating the facility at Beit Bridge if there are other obvious choices closer to Musina.

Based on the above, the conceptional approach is to locate the facility at the T-junction where the Pontdrift road intersects with the N1.

Diagram 1 illustrates the concept.


TRAFFIC CONTROL CENTRE: MUSINA
DIAGRAM 1
WIM
Weigh-In
Motion Facilities
Beit
Bridge
Future
Toll Gate
North
N1
South
WIM
WIM
PONTDRIFT
Traffic
Control
Centre
Inspection
Area
Current
Weigh
Bridge
WIM
Messina

2.3 DEVELOPMENT CONSIDERATIONS

The optimum location of a load control centre is of vital importance to maximise the control that can be exercised over the overloading by freight vehicles. As such, the location of one particular centre should also be considered in combination with the location of other similar facilities along a specific national corridor such as the N1.

An Overloading Control Strategy is usually developed for a specific corridor, which includes the optimum location of load control facilities, ranging from full scale Load Control Centres, such as Mantsole to Weigh in Motion sites to weigh lay bays that is equipped by a roving team of overloading control officers.

The typical steps that should be undertaken to develop a holistic overloading strategy for the province are:

- Inventory of existing practice;
- Development of an overloading control strategy;
- Quantification of the capital and operational costs to implement the strategy;
- Development of an overloading control implementation strategy through public private partnerships;
- Evaluation of the alternative funding mechanisms available to implement the strategy;
- Development of overloading control management system, which includes an inventory and management module;
- Technical assistance with the implementation of the overloading control strategy;
- Training of staff members;
- Integration with other management systems

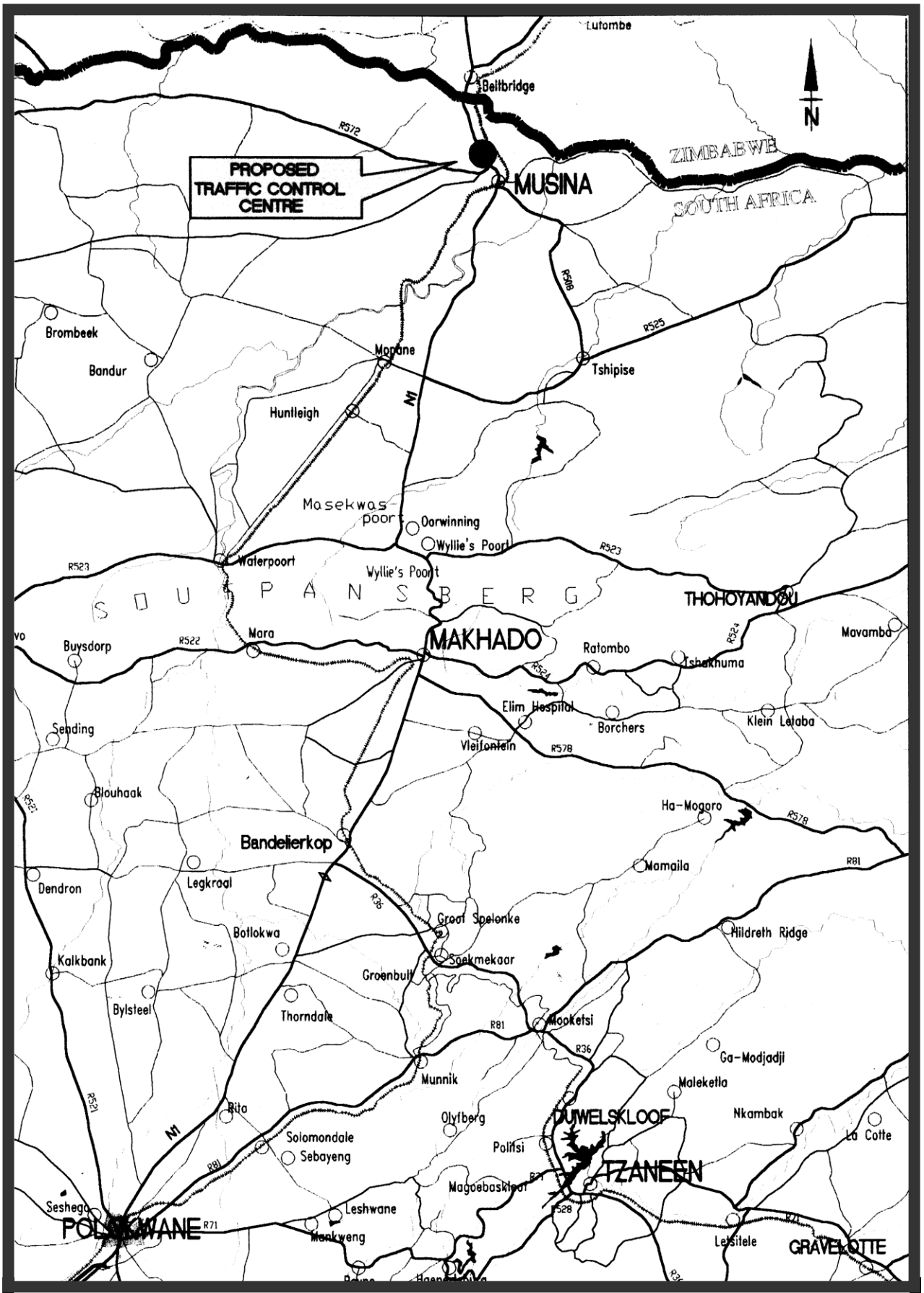
The aim of this study was, however, to identify a location for a Traffic Control Centre and Load Control Centre, that will fit in with a total strategy for the Limpopo Province and to provide an indication of a typical layout and costs associated with the development of an integrated Load Control and Traffic Control Centre with ancillary facilities.

The LCC should be situated such that it performs the most effective control possible on all heavy vehicle traffic entering or leaving South Africa. With a new LCC facility in the north and the Mantsole LCC close to Pretoria, it will become increasingly difficult to by-pass these control points via alternative routes. Based on the above considerations, a very appropriate location for the LCC would be somewhere between the South African border and the N1 / R572 intersection north of Musina – see Photographs attached as **Annexure A.**

The border post at Musina creates a bottleneck, with hardly any other route to get there except to use the N1 between Musina and Beitbridge, which makes this section of road ideal for a LCC. Supportive to this, a truck-inn, filling station and other road user facilities on the N1 just before the border post would be ideal for long distance travelers.

The most suitable location considered at this stage is just north of the N1-intersection with the Pontdrift road (R572) a few kilometers north of Musina. The average annual daily traffic (AADT) at this position is approximately 2 000 vehicles per day, of which more than 20% are heavy vehicles. Approximately 50% of this heavy traffic can be classified as ‘long’ heavy vehicles.

The majority of the heavy vehicles travel all the way to the border post at Beitbridge and beyond. The proposed location for a Load Control Centre is indicated on **Figure 1 – Locality Map**.



LOCALITY MAP
FIGURE 1

3. OPERATIONAL PRACTICES AND LAYOUT OF TYPICAL TRAFFIC AND LOAD CONTROL CENTRE

3.1 BASIC COMPONENTS AND OPERATIONAL PRACTICES

A load control centre typically consists of the following major components:

- Low-speed screening scale.
- Control point.
- Static weighbridge and control room.
- Holding yard for overloaded vehicles.

a) Low speed screening scale

The purpose of the low speed screening scale is to identify overloaded vehicles before they enter the load control centre. Vehicles that are clearly not overloaded are allowed back onto the main road without any further delay, while vehicles that are overloaded are diverted to the static weighing facility.

The advantage of using a screener is two-fold:

- Delays at the static weigh-bridge are reduced since no unnecessary vehicles are weighed; and
- Drivers of legally loaded vehicles are not hindered, hence keeping the driver population more positive towards overloading control in general.

Screening scales should preferably be installed in auxiliary screening lanes to avoid trucks travelling over these scales at low speed from inhibiting general traffic flow. On low volume roads, screeners may however be installed in the normal traffic lanes if budget constraints do not allow for separate screening lanes, but this layout is not desirable.

b) Control point

Once heavy vehicles have been screened, some sort of control is necessary to separate overloaded vehicles from legally loaded ones. This may be accomplished using a fully automated traffic signal system, or a manual method where traffic police respond to a signal and then manually divert overloaded trucks to the static weighbridge.

The choice of control goes hand in hand with the layout of the screening lanes with respect to the LCC. If screening scales are installed in auxiliary lanes and overloaded vehicles cannot gain access back to the main road without passing through the static weighbridge, fully automated control can be used.

In all other cases, traffic police will be responsible for the separation of overloaded trucks from legally loaded ones.

c) Static weigh-bridge and control room

Vehicles that have been identified as overloaded are weighed on the static scale, since prosecution for overloading may not be based upon dynamic weights. A grace limit of say 5% is generally allowed before a driver is prosecuted for overloading. If a vehicle is overloaded within the 5% of the legal limit, the driver is thus not fined, and allowed back onto the main road.

Vehicles that have been found to be overloaded above the graced limit are fined (these fines are issued by traffic officers from the control room). Such vehicles must proceed to the holding yard, rectify their loads and return to the weighbridge for a re-weigh to verify that they are fit to be released back onto the main road. The graced limit generally does not apply for re-weighs.

d) Holding yard

The holding yard is used to accommodate overloaded heavy vehicles while their loads are rectified. In some cases, loads only need to be repositioned on the vehicle to reduce the loads on overloaded axles. In some cases, however, a portion of the load needs to be removed and loaded onto another vehicle. In such cases, a vehicle may spend a considerable amount of time in the holding yard.

3.2 TYPICAL LAYOUTS

Three typical layouts for the proposed facilities are shown in **Figures 2, 3** and **4** attached:

- Figure 2 – Traffic Control and Load Control Centre – Type 1.
- Figure 3 – Traffic Control and Load Control Centre – Type 2.
- Figure 4 – Traffic Control and Load Control Centre – Type 3.

3.2.1 Traffic And Load Control Centre - Type 1.

Figure 2 (Type 1) indicates a facility where the Load Control Centre is located on the eastern side of the N1 and the Traffic Control and Ancillary facilities are located on the western side of the N1.

All heavy vehicles are diverted into an auxiliary lane, where their speed is reduced before a weigh-in-motion screener weighs the vehicles - overloaded vehicles are directed to the static weighbridges via the loop road (northbound vehicles) and a slip lane (southbound vehicles).

The vehicles are detained if the static weighbridge confirms that the vehicles are actually overloaded, either in terms of the total mass of the vehicles or specific axle groups.

Access to the Traffic Control Centre is provided at a conventional at-grade intersection north of the LCC.

A filling station and ancillary facilities are proposed opposite the Traffic Control Centre.

3.2.2 Traffic And Load Control Centre - Type 2

The Type 2 facility shown in **Figure 3** is a variation on the Type 1 facility.

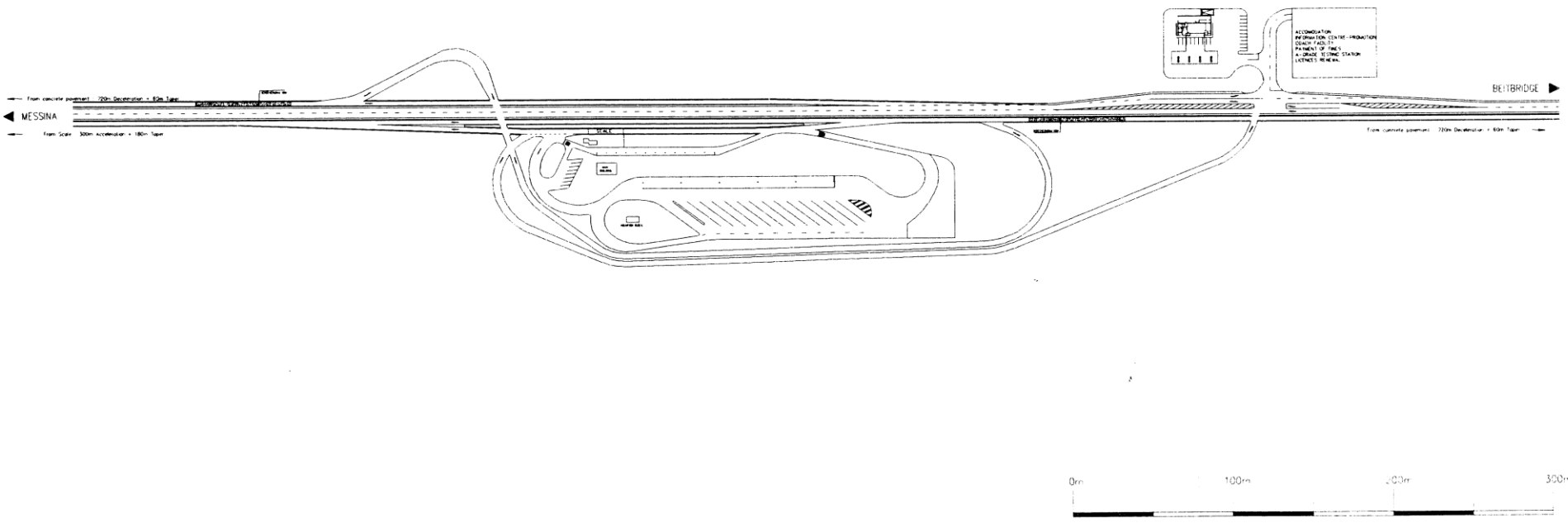
The only difference is that all the facilities as identified for Type 1 are located on the western side of the N1.

3.2.3 Traffic And Load Control Centre - Type 3

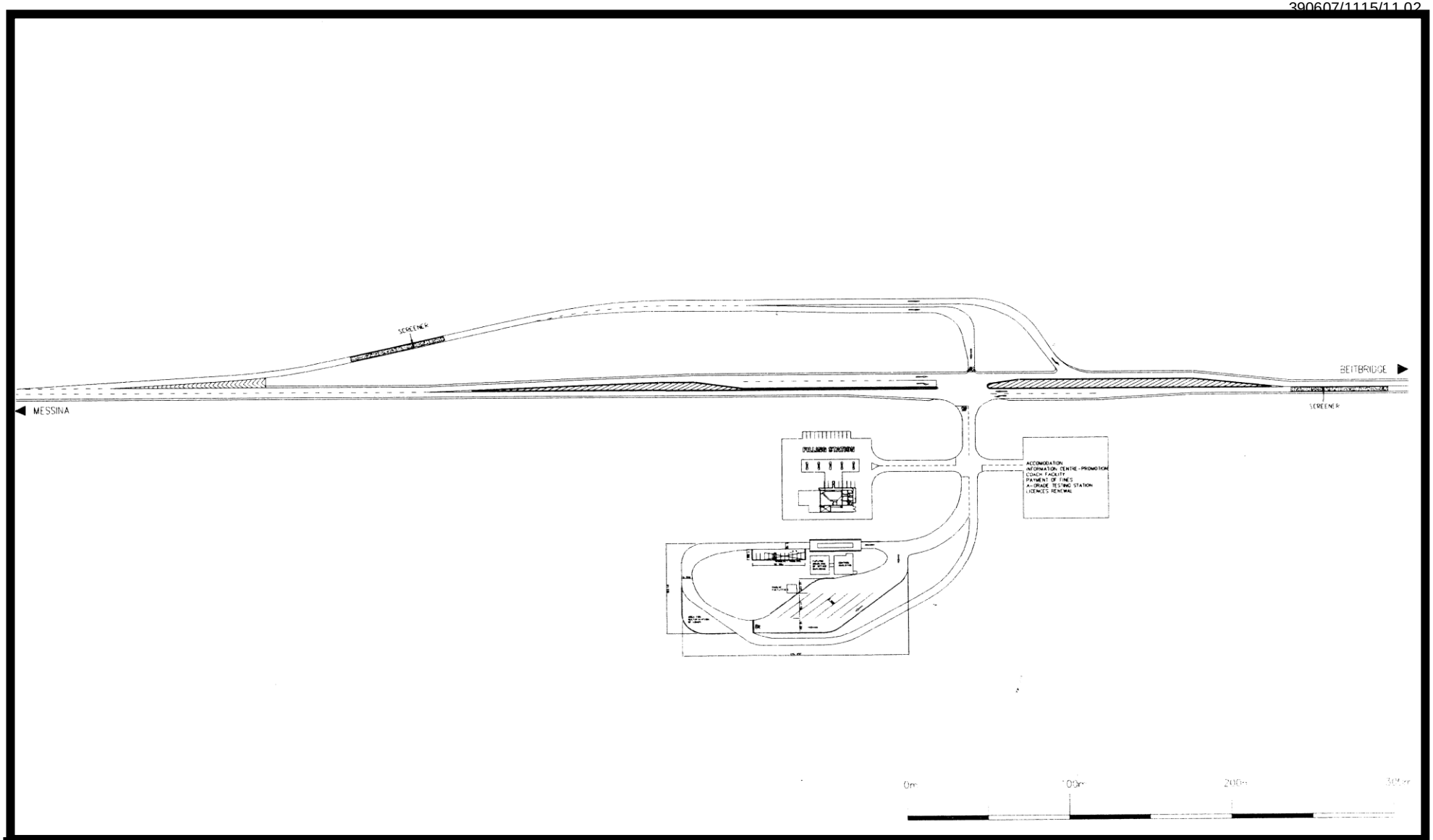
The Type 3 facility shown in **Figure 4** is a scaled down and less expensive variation off Types 1 and 2.

All the facilities are also located on the western side of the N1 as in the case of Type 2, with an at-grade access providing access to all the facilities.

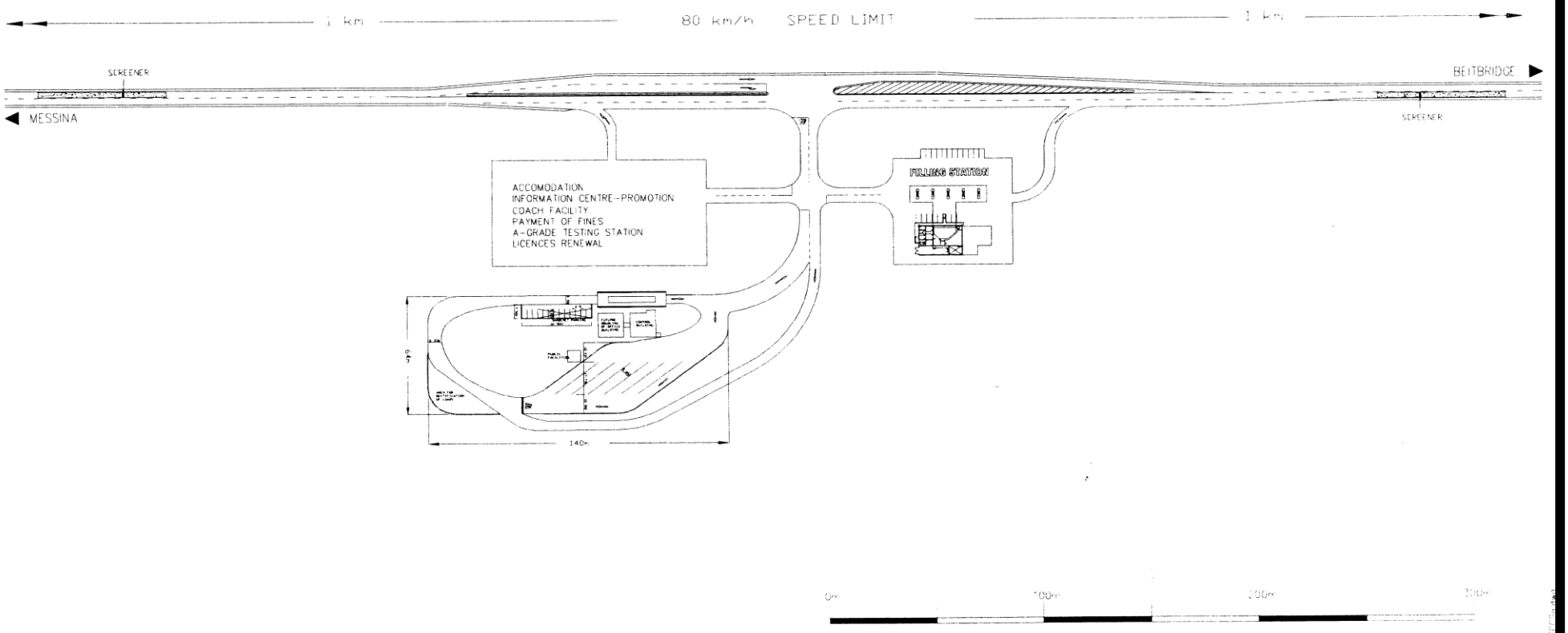
Traffic officials will have to direct overloaded vehicles to the Load Control Centre, compared with a variable message and traffic signal system that direct overloaded vehicles to the Load Control Centre.



PROPOSED LOAD CONTROL SYSTEM
TYPE 1
FIGURE 2



PROPOSED LOAD CONTROL SYSTEM
TYPE 2
FIGURE 3



PROPOSED LOAD CONTROL SYSTEM
TYPE 3
FIGURE 4

4. STANDARDS AND REQUIREMENTS: TRAFFIC CONTROL CENTRE

4.1 SCOPE

This section deals with the minimum standards and requirements that the detail design, the equipment and construction must comply with in respect of load control centres (LCC) and lay-bys (LB).

The specifications can also be expanded to include electrical, lighting, lightning protection and communication equipment, but were not considered appropriate to address in detail at this level of the proposal. The specifications provided will thus focus on the basic infrastructure, i.e. road works, civil works and buildings.

4.2 GENERAL

In general, the design and specifications should comply with the relevant SABS or BS specifications and codes of practice and should conform to good practice for the particular discipline if no applicable specification or code of practice exists.

The permanent infrastructure should be designed for low maintenance with a 20-year minimum life. All design work and registered professionals or professional firms should execute compilation of specifications.

4.3 ROADWORKS

4.3.1 Horizontal and Vertical Alignment Standards for Screening and Legal Weighbridge Lanes.

a) Horizontal alignment

At the legal weighbridge, the alignment should be straight for a distance of at least 30 m on both sides of the weighbridge to enhance operational procedures.

b) Vertical alignment

The vertical alignment of the existing main road shall be accepted as fixed.

The gradient leading to the screening facility (scale) should be as flat as possible and shall not exceed 1,0%. At the static legal weighbridge, there should be a level approach and exit surrounding the weighbridge platforms in order to minimise unnecessary impacts when the truck wheels move on to the steel platforms.

The approach and exit maneuvers must be as smooth as possible otherwise movement of the weighbridge platforms may result, which would lead to frequent maintenance.

c) Access layout

Access on provincial roads should be designed in accordance with the appropriate typical drawings of the Limpopo Provincial Government, Department of Public Works, Roads and Transport.

Access on National Roads in South Africa should be designed in accordance with the standards of The Department of Transport: “Toegang van en na fasiliteite langs Nasionale Deurpaaie” (September 1991)”.

4.3.2 Standards for Parking Areas

a) Site layout

The site layout should be designed to accommodate at least type WB20 (AASHTO) design vehicles. The minimum radii used on the site must be such that the abovementioned design vehicle can maneuver with comfort on the paved areas.

The paved area should include space where truckloads can be rectified by forklift or other means.

The gradients on the site should not be less than 1% or more than 3%.

Provision must be made for at least six holding bays for type WB20 (AASHTO) vehicles at each LCC as well as each lay-by.

The applicable building lines for a particular site must be adhered to.

The queuing lengths prior to the weighbridge must allow for at least three types WB20 (AASHTO) design vehicles.

b) Staff parking area

A shade cloth covered parking area for vehicles of officials should be provided on each site.

A minimum of three parking bays must be provided at each lay-by site and a minimum of ten parking bays at the LCC site.

c) Visitors and deliveries

Visitors, maintenance vehicles and deliveries at each LCC must provide a minimum of four uncovered parking bays for use.

d) Parking area for vehicles carrying hazardous materials or dangerous goods

Provision is to be made in the layout of each facility for a spillage sump and parking area for vehicles carrying hazardous materials.

e) Dumping

Dumping of cargo at any site to decrease the mass/load of a vehicle is prohibited and no such facility is required.

4.3.3 Weighbridge Alignment

The alignment of weighbridges shall be in accordance with the requirements of the SABS and the manufacturer. Note that the manufacturer's tolerances are normally very small and adjustments can be made.

The road surfaces must be smooth, straight and flat at the approach and exit ends of the weighbridges.

Pavements must be in concrete for 30 m at both the approach and exit ends of the weighbridge.

4.3.4 Road Traffic Signs, Road Markings, Traffic Signals and Booms

a) Road traffic signs and signals

At specified LCC sites, electronic information, warning, regulatory and variable message signs must be used to regulate and control vehicle movements within the vicinity of the LCC sites.

The electronic signs must be designed, supplied, installed/erected, and commissioned under a separate contact by the Systems Provider. Tenderers should allow in their pricing for this contract for co-operating with the System Provider during the design and construction stages of the contract.

All appropriate fixed (non-electronic) traffic signs and information signs must be provided in accordance with SA Road Traffic Signs Manual (SARTSM) specifications. Where applicable, specially designed signs can be erected.

b) Road traffic markings

Deceleration lanes, screening lanes, approaches to the weighbridges, parking areas and acceleration lanes must be marked clearly according to normal geometric standards, and where applicable, according to the appropriate typical drawings of the Limpopo Provincial Government, Department of Public Works, Roads and Transport and/or the SA National Roads Agency as applicable.

The road marking material must be reflective and due to the higher than normal wear and tear that will be induced, more durable material must be used (e.g. “Thermo Plastics”) with possibly heavier application rates. Road studs must also be used where required.

4.3.5 Pavement Design

All pavements must be designed for a 20-year design life to a higher standard than the normal E80 standard. Pavements must be able to withstand the overloaded axle masses of vehicles and the design must be based on 30% overloading keeping in mind that isolated cases of 100% overloading on an axle may occur.

The impact of turning and stopping movements of these vehicles must also be taken into account.

The pavement design for each site, which should at least comply with the standards laid down by the South African National Roads Agency, must part of the tender contract.

Concrete paving and/or block paving for specific areas appropriate to the pavement design and traffic movements must be constructed.

The structural strength of concrete pavements should suit the design but must not be less than 30 MPa.

4.3.6 Storm Water Drainage

The existing cross drainage under the main road may need to be extended under the new works.

To reduce costs, the site must be drained by means of surface drainage as far as possible and pipe systems with inlet structures are to be limited.

4.3.7 Fencing and Traffic Control

The perimeter of all sites must be fenced with security fencing at least 1,8 m high.

The layout of the site must be such that no vehicles will be able to exit from the site before being properly released by the system, (i.e. via the weighbridge) and that no unauthorized vehicles or persons will be able to enter it.

Appropriate access control, guardrails, ditches, beams etc must be utilized to achieve this. No traffic control booms are to be used.

All sites shall be provided with lockable gates.

4.4 CIVIL WORKS

4.4.1 Water supply and Reticulation for LCCs

The water supply and reticulation must be designed according to normal practice. "The Guidelines for the provision of Engineering Services and Amenities for Township Development" must be used as a guideline.

Allowance is to be made for at least 25 persons per 8-hour shift at each LCC.

Water from existing water mains or from borehole(s) to be drilled and equipped by the contractor must be used to supply water for all purposes including washing, cleaning, human consumption, gardening and fire fighting.

Elevated storage tanks must be installed for emergency water supply during disruptions in the normal supply as well as for fire fighting purposes.

4.4.2 Sewage Reticulation and Disposal for LCCs

The sewage reticulation and disposal systems must be designed according to normal practice. "The Guidelines for the provision of Engineering Services and Amenities for Township Development" shall be used as a guideline.

Allowance is to be made for at least 25 persons present on site per 8-hour shift at each LCC.

The disposal of sewage and wastewater must be handled by means of septic tanks and soak ways (French drains). Where the soil conditions are not suitable, or the soak away will be within 50 m from a river or, if required by environmental factors, conservancy tanks must be provided.

However, if an existing sewer main is present in close proximity of the LCC, it should be utilized if the capacity of the line can accommodate the additional flow.

4.5 BUILDINGS

4.5.1 General

a) Design

The buildings must be designed to conform to the South African National Building Regulations and the requirements of the local authorities (where applicable).

Materials used must be durable with low maintenance cost of acceptable appearance and cost, and must be suitably resistant to potential vandalism.

The buildings should provide for operation on a continuous, 24-hour per day basis.

b) Specifications

The general specification applicable to all conventional brick building work to be executed under this Contract are the Model Preambles for Trades 1999 edition published by the Association of South African Quantity Surveyors.

4.5.2 Buildings Required

a) Introduction

A control building should be provided where weighing, prosecuting and administrative actions could be executed.

A structural steel building should be provided over the weighbridge and the latter should be operated from the control building.

b) Critical Requirements

- Building over weighbridge

  Size: The building columns must be positioned to provide a clear working space of 2000 mm on each side of the weighbridge platforms and 5000 mm in the front and at the back of the weighbridge

  Height: The height of the building must provide a clearance for maximum allowable loads but not less than 5200 mm above the scale platforms.

  Side sheeting: Side sheeting must be provided from the roof to 2 m above the scale platforms on both sides of the building and from the roof to the clearance height of both ends.

- Position of Scale Master's Office

  The Scale Master's office is to be located in line with the transverse centre of the multi-platform weighbridge in a position that will provide optimal observation of the position of truck wheels on all scale platforms for the scale master.

- Line of sight

  The line of sight from the Scale Master's desk to the first 500 mm length of edges of the scale platforms closest to the office shall be clear and not be obstructed by building columns or any other features.

  This is required to enable the Scale Master to provide undisputed evidence regarding the position of the truck wheels on the platforms.

4.6 CONCEPTUAL LAYOUT PROPOSALS

Conceptual layouts that may be considered for the design of a LCC and other facilities are shown on the **Figures 2 to 4** attached.

The selection of the most appropriate layout will be subject to the following considerations:

- Through traffic on the N1 will influence capacity and safety of turning lanes.
- Number of heavy vehicles on the roads will dictate the requirement for storage space in queuing lanes, the holding yard etc.
- Availability of manpower will dictate the type of control and signaling system to handle trucks.
- Availability of funds will inevitably dictate the extent of the facility.

It will be noted that the land uses added to the LCC are separated from the load control infrastructure and road network for safety and practical reasons. The three layouts shown on the attached figures show different levels of infrastructure:

- The Type 1 layout (**Figure 2**) represents a large facility which hardly inhibits traffic flow on the main road end can handle a substantial volume of heavy vehicles, and is thus suitable for high volume roads with a high percentage of trucks. The LCC is also totally separate from the other facilities proposed.
- The Type 2 layout (**Figure 3**) also represents a large facility similar to the Type 1 layout. The LCC and the other facilities are, however, located on the same side of the road and all traffic movements are accommodated at the same intersection.
- The Type 3 layout (**Figure 4**) represents an LCC on the opposite side of the spectrum, and can only be operated on low volume roads since the screening scales are situated in the main road and heavy vehicles have to be diverted to the LCC manually by traffic officers.

Considering the location and extent of traffic associated with the proposed LCC north of Musina, the implementation of a Type 3 layout (**Figure 4**) is recommended.

5. REQUIREMENTS: OTHER SUPPORTING FACILITIES

5.1 SCOPE

This section deals with the requirements for the other transport related and supporting commercial facilities listed underneath:

(i) Transport Related Facilities

- Truck-inn facility.
- Public transport transfer facility

(ii) Supporting Commercial Facilities

The following supporting facilities and activities are considered appropriate for establishment adjacent to the Traffic and load Control Centre:

- Fuel station.
- Accommodation
- Recreational facilities
- Fast food outlet and restaurant
- Arts and craft stalls.
- Informal hawker stalls.

5.2 APPROACH

The intention of this section is not so much to provide detailed **technical** requirements of the other transport and other supporting facilities, but rather to focus on the need for –, type of - and general circumstances and requirements for these facilities.

The technical specifications for these facilities are those that are generally applicable to any building structure subject to local government rules and specifications.

For some of these facilities, such as the public transfer facilities and the truck-inn facilities, the technical requirements are specified in other preceding and succeeding interim reports.

Underneath the facilities are discussed under the two main category headings indicated above.

5.3 TRANSPORT RELATED FACILITIES

Transport related facilities are those facilities that are deemed necessary to be provided as part of the comprehensive integrated transport system comprising of services and infrastructure.

As such these facilities would generally be funded by public sector should the provision of such facilities form part of a policy requirement or if they form part of the transport regulatory system.

Preferably these facilities should also be funded by private sector developments (fully or partly) but obviously only if business prospects are eminent to these developments. As a result, for each of the suggested facilities that are to be provided at any of the development nodes, the potential for private sector development should be explored.

5.3.1 Truck Inn Facilities.

(i) Need for a Facility

The question is whether or not a comprehensive truck-inn facility should be provided at Musina as part of the Traffic Control Centre, given the general customs activities and facility developments at Beit Bridge.

The following factors are relevant:

- A new privately developed truck-inn facility is available at Beit Bridge within 15 kms distance from Musina. As such, from a business point of view, another truck-inn at Musina would be counter productive for the private sector facility at Beit Bridge.

- Regardless the existence of the Beit Bridge facility, it could nevertheless be motivated that a truck-inn facility at Musina must be provided should it become policy to provide at least one such facility at all main towns along the national and provincial corridors. Refer to the section contained in the interim report for the Gateway Logistics Centre.

- Vehicles that are called in for inspection into the traffic control centre at Musina might be required to stay overnight for any particular regulatory or other technical reason. For this purpose, vehicles could be forced to overnight at the facility. However, a comprehensive truck-inn is not required for this purpose and the staging/parking area of the Traffic Control Centre should accommodate this need.

(ii) Recommendation

No truck-inn should be provided at Musina unless a separate private sector development arises as a spontaneous market related reaction. In the absence of such development, the Beit Bridge truck-inn should be considered as the facility to accommodate the Musina needs in this respect.

5.3.2 Public Transfer Facilities

(i) Need for a Facility

A comprehensive multi modal public transfer facility is available within the centre of Musina adjacent to the railway station. A similar facility at the Traffic Control Centre would be duplication.

However, there could be a need for a specialized tour bus stop that could be located at this node. This possibility is nevertheless subject to other tourist accommodation facilities to be provided at any particular node and if such facilities are not provided at the Traffic Control Centre, then a tour bus stop is also not required. See section 5.4.2.

(ii) Recommendation

A tour bus stop should only be provided as part of a tourist hotel facility at this node. Refer to the recommendations in section 5.4.2.

(iii) Requirements

- Tour buses require a parking bay that measures 3.7 meters X 15 meters.

- At last, two parking bays should be provided as part of the parking area of the hotel.

- Covered parking bays are not a necessity but preferable.

- Parking bays should be paved, preferably paving blocks or concrete. Tar paving is also acceptable but not preferred because of oil and diesel leakages and damage that is caused by turning movements particularly in hot climate areas.

- Special safety precautions have to be made in view of theft and criminal risks attached to expensive buses. In special circumstances, the bus parking area could be fenced off as a safety precaution.

5.4 COMMERCIAL FACILITIES

In principle, commercial facilities should only be provided as part of private sector developments. The role of public sector in this respect would generally speaking only be in terms of a facilitating role and in terms of the normal local government authorizations for land developments.

However, it is possible that specific government objectives would require stimulation of certain developments to be undertaken by private sector for economic development and other social purposes, in which case some incentives could be granted such as the donation of government land.

Nevertheless, it is also the duty of government to ensure that the land use rights are put in place and when, for example, it is considered important that accommodation, filling stations and other supporting facilities should be provided at these specified nodes, the conceptional framework and land use rights are not an inhibiting factor.

With these principles in mind, certain commercial land uses are generally associated with normal transport activities and as a result, the potential of these activities for private sector development, as part of - or in combination with, the public sector developments, must be explored.

5.4.1 Fuel station

(i) Need for a Facility

A fuel station is normally the prime – or anchor business for many nodal developments along transport routes and in the absence of a fuel station, other commercial activities are less feasible.

The potential for a fuel station is usually also directly dependent on the traffic volumes and the presence of other fuel station near by. Furthermore, the potential is also influenced by the extent to which a particular node is an automatic end destination for vehicles.

Based on the above, some potential exists for a fuel station at or adjacent to the proposed Musina traffic control centre. The other fuel stations within the town and at Beit Bridge have to be taken into account and also the extent of traffic towards and from Zimbabwe that is, in turn, influenced by the extent of economic and political stability in that country.

Should a fuel station not be feasible, the feasibility of other commercial activities would equally be in doubt.

(ii) Recommendation

- Land use rights should be granted to establish a fuel station and other supporting commercial activities at or adjacent to the Traffic Control Centre.
- Government land should be donated to accommodate such developments.

- Proposals should be invited from oil companies and other private sector parties to develop a fuel station and supporting commercial activities at the site indicated below.

(iii) Requirements

The type of fuel station at this node should incorporate a fast food outlet and a restaurant depending on the components of the hotel, should it be provided adjacent to the fuel station.

Other than the availability of the land and land use rights to allow for a fuel station, the normal technical requirements for such developments prevail.

However, it is a requirement that an integrated facility be provided that incorporates the other commercial activities indicated below.

5.4.2 Accommodation

(i) Need for a Facility

The need for a hotel facility is dependent on the market for the following:

- Tourists travelling between South Africa and Zimbabwe
- Road hauliers that prefer not to sleep in their trucks (occasionally) or that need to overnight their vehicles at the traffic control centre.
- Local population that would use some recreational facilities at the hotel on an ad hoc basis.

The market volume for the first item could perhaps be meaningful depending on the situation within Zimbabwe, but doubts exist on the market volume for the second item. The last item would mostly depend on the attraction of entertainment value of the hotel itself.

Nevertheless, the risk of market volume would be a judgment call for the private sector and at most, a government incentive for such a development could be in the form of assistance with low cost or donated land.

(ii) Recommendation

A portion of the entire node should be reserved for a hotel development but any further development in this respect should be a private sector initiative.

A consortium development with the hotel and the fuel station as the main economic activities should be considered.

Land should be made available at no cost and private sector proposals should be invited.

(iii) Requirements

Other than normal accommodation, the hotel should cater for other entertainment and recreation facilities such as a sports bar and pool tables, a restaurant (two classes), arts and craft outlets and conference facilities.

Two categories of hotel accommodation should be considered, namely the tourist class accommodation and secondly a more affordable road haulier class of accommodation.

5.4.3 Fast food outlet and restaurant

See 5.4.1 and 5.4.2

5.4.4 Arts and craft stalls.

See 5.4.1 and 5.4.2

5.4.5 Informal hawker stalls.

Informal hawker stalls are not recommended to be part of either the fuel station or the hotel developments, given the nature of these developments.

6. SUMMARISED BUSINESS PLAN

6.1 REQUIRED FACILITIES

- A Traffic Control Centre (TCC) and a Load Control Centre (LCC)
- Ancillary facilities including a filling station, hotel accommodation in two categories for tourist and road truckers respectively, restaurant and fast food outlets, arts and craft, recreation and entertainment facilities such as a sports bar and pool tables.
- The facilities should be located directly north of R572 / N1 intersection.

6.2 PRIORITY

High - the eradication of overloaded vehicles on the national and provincial road network has a dramatic impact on the life of the pavements and the required maintenance and rehabilitation costs needed to keep the road network in a maintainable condition.

6.3 ACTIONS

The following actions are required:

(i) As a first step, principle approval should be obtained that a traffic and load control centre is required at Musina subject to a detailed investigation and design process upon which the final approval will be made after consideration of the recommendations made.

(ii) The detailed investigation should include a comprehensive overloading control strategy for the Limpopo Province. This strategy should confirm or amend the positioning of such a facility at Musina.

(iii) The above actions include discussions with the National Roads Agency to fund the construction of the proposed Load Control Centre, to finalize the location of the facility, and to obtain their commitment towards the joint financing of the proposed LCC.

(iv) The final recommendations are then to be submitted to Limpopo Provincial Government for consideration.

(v) Budget must be provided to undertake the detailed investigation and design phases.

(vi) Finalize the extent of the development and identify potential sponsors of development including SANRAL and Limpopo Province, National Department of Transport; private sector for the filling station, hotel and other supporting commercial facilities.

(vii) An implementation process should then be initiated once the principle of the development is finally approved, including steps to ensure land acquisition and land use rights, a topographical survey of the site, the detail design of the facility and the implementation of the facility in phases;

The time program for the above would be:

- 2003/04: Investigations, consultation and detailed design
- 2004/05: Implementation

6.4 FINANCIAL IMPLICATIONS

6.4.1 Estimated Budget

A preliminary estimate to prepare a **provincial overloading control strategy** and conduct **further investigations** (surveys, discussions with potential partners, cost of servicing the site etc.) and the **detail design** for the next financial year is:

- **2003/2004:** R2-3 million (investigations, consultation, planning and design).
- **2004/2005:** R27 million (implementation). Refer to the table underneath.

The provincial budget requirements for implementation will depend to a large extent on the commitment received from SANRAL and other private role players.

The financial implications of the provision of a Load Control Centre combined with a truck-inn; filling station, overnight facilities etc. were estimated in consideration of different LCC's recently constructed on the N4 corridor and are given below:

6.4.2 Detailed Cost Estimates

A preliminary estimate is provided for the development costs of the facilities. The actual cost will depend on the extent and layout of the Load Control Centre, as well as the extent of the proposed secondary facilities.

The expected costs, based on the three conceptual layouts provided (See **Figure 2, 3,** and **4**) are, however, as given in **TABLE 1** below. Please note that the cost estimate excludes the cost of expropriation (if required), the cost of the land required and the operational and management costs to operate and man the LCC and TCC.

PRELIMINARY COST ESTIMATES: TRAFFIC CONTROL CENTRE			TABLE 1
ITEM	**TYPE 1**	**TYPE 2**	**TYPE 3**
LOAD CONTROL CENTRE			
Earthworks, terracing, landscaping	R 220 000	R 175 000	R 150 000
Internal site roads, parking, holding areas	R 8 500 000	R 4 300 000	R 2 600 000
Weighbridge (installation & commissioning)	R 300 000	R 300 000	R 300 000
Weighbridge civils	R 65 000	R 65 000	R 65 000
Storm water drainage	R 110 000	R 110 000	R 110 000
Services (potable water, sewer) supply	R 1 000 000	R 1 000 000	R 1 000 000
Control building including fixed furniture	R 850 000	R 850 000	R 850 000
Emergency generator, fuel tank, foundations	R 300 000	R 300 000	R 300 000
Telephone system & connection	R 35 000	R 35 000	R 35 000
Site electrical supply	R 55 000	R 55 000	R 55 000
Site electrical reticulation inc., switchgear	R 225 000	R 225 000	R 225 000
Roadway lighting	R 320 000	R 320 000	R 320 000
Earthing and lightning protection	R 25 000	R 25 000	R 25 000
Public address system	R 7 000	R 7 000	R 7 000
Finishing & re-vegetation	R 100 000	R 85 000	R 60 000
Road signage	R 100 000	R 100 000	R 100 000
Fencing	R 140 000	R 90 000	R 90 000
Electronics, software and technical support	R 1 000 000	R 1 000 000	R 100 000
SUB TOTAL	**R 13 352 000**	**R 9,042,000**	**R 6 392 000**
CONTINGENCIES (15%)	R 2 002 800	R 1 356 300	R 958 800
PROFESSIONAL FEES (10%)	R 1 335 200	R 904 200	R 639 200
TOTAL	**R 16 690 000**	**R 11 302 500**	**R 7 990 000**
SECONDARY FACILITIES			
Filling station	R 5 000 000	R 5 000 000	R 5 000 000
Restaurants	R 1 200 000	R 1 200 000	R 1 200 000
Traffic offices	R 1 500 000	R 1 500 000	R 1 500 000
Tourism centre	R 600 000	R 600 000	R 600 000
Hotel (Assume 50 beds)	R 7 200 000	R 7 200 000	R 7 200 000
SUB TOTAL	**R 15 500 000**	**R 15 500 000**	**R 15 500 000**
CONTINGENCIES	R 2 325 000	R 2 325 000	R 2 325 000
PROFESSIONAL FEES (10%)	R 1 550 000	R 1 550 000	R 1 550 000
TOTAL	**R 19 375 000**	**R 19 375 000**	**R 19 375 000**
GRAND TOTAL	**R 36 065 000**	**R 30 677 500**	**R 27 365 000**

7. RECOMMENDATIONS

It is recommended that:

7.1 TRAFFIC AND LOAD CONTROL CENTRE AT MUSINA:

(i) A Traffic and Load Control Centre at Musina be established at Musina at a position indicated in section 2.

(ii) The lay out and type of facility should be subject to further technical investigation as part of the detailed design, but it is recommended that a Type 3 facility be implemented.

(iii) The technical specifications listed in section 4 are proposed as a general guideline but will also be subject to further investigation suggested in the recommendation above.

(iv) Part of the detailed investigation is to develop a comprehensive overloading control strategy for the Limpopo Province which must confirm the positioning of such a facility at Musina and secondly discussions with the National Roads Agency to fund the construction of the proposed Load Control Centre north of Messina. An implementation process should then be initiated once the principle of the development is finally approved.

(v) The final recommendations are submitted to Limpopo Provincial Government for consideration.

(vi) The Provincial Government budget an amount of R2 million to develop a comprehensive overloading control strategy for the province and to initiate the development of the Traffic and Load Control Centre at Musina.

7.2 OTHER ADJACENT TRANSPORT RELATED AND COMMERCIAL FACILITIES

(i) No truck-inn should be provided at Musina unless a separate private sector development arises as a spontaneous market related reaction.

(ii) In the absence of such development, the Beit Bridge truck-inn should be considered as the facility to accommodate the Musina needs in this respect.

(iii) No other public transfer facility should be developed at this node other than a tour bus stop that is in turn subject to the development of a tourist hotel facility at this node.

(iv) Land use rights should be granted to establish a fuel station and other supporting commercial activities at or adjacent to the Traffic Control Centre.

(v) Government land should be donated to accommodate the above proposed commercial developments.

(vi) Proposals should be invited from oil companies and other private sector parties to develop a fuel station and supporting commercial activities at the site indicated below.

(vii) A portion of the entire node should be reserved for a hotel development but any further development in this respect should be a private sector initiative.

(viii) Private sector proposals should be invited for a consortium development with the hotel and the fuel station as the main economic activities.

(ix) Informal hawker stalls are not recommended to be part of either the fuel station or the hotel developments, given the nature of these developments.

ANNEXURE A

- Photo 1: The N1 and R572 T-junction
- Photo 2: Northwest corner of the T-junction
- Photo 3: The N1 from the T-junction North to Beitbridge
- Photo 4: The cross-border control office at the T-junction
- Photo 5 and 6: Road signage at T-junction
- Photo 7: The current weighbridge at Musina, adjacent to the proposed site
- Photo 8: Trucks parked on the staging area at the current local control facility with the N1 in the background
- Photo 9,10 and 11: Buildings and support facilities at the weighbridge
- Photo 12: An illustration of the bottleneck situation at Beitbridge

MUSINA

PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

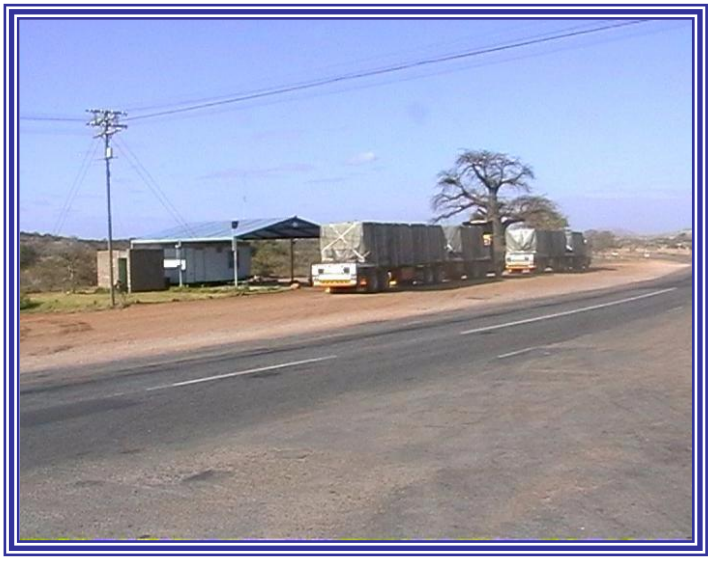


PHOTO 5

PHOTO 6

PHOTO 7

PHOTO 8

PHOTO 9

PHOTO 10

PHOTO 11

PHOTO 12